

NORTH AMERICAN CHARIPIDAE: KEY TO GENERA,
NOMENCLATURE, SPECIES CHECKLISTS, AND A NEW
SPECIES OF *DILYTA* FÖRSTER (HYMENOPTERA: CYNIPOIDEA)

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Abstract.—The nomenclature of the 35 North American species of Charipidae is reviewed. The following **new synonymies** are proposed: *Allotria ambrosiae* Ashmead, 1898, *Glyptoxysta necans* Kieffer, 1909, *Bothrioxysta numidica* Kieffer, 1909, and *Charips flavipes* Ionescu, 1963 = *Phaenoglyphis villosa* (Hartig), 1841; *Alloxysta vandenboschi* Andrews, 1978 = *Alloxysta obscurata* (Hartig), 1840; *Allotria tritici* Fitch, 1861 and *Charips areolata* Kieffer, 1909 = *Alloxysta victrix* (Westwood), 1833. Synonymic checklists are presented for the North American species, and those in the primarily Old World genera *Apocharips* and *Dilyta*. Characters previously used to separate the Charipinae and Alloxystinae are reviewed and illustrated (several are unreliable), and an illustrated key to the five genera in the family is provided. *Adelixysta* Kierych, 1988 is **synonymized** with *Alloxysta* Förster, 1869. A new species, *Dilyta rathmanae*, is described from the state of Washington; it is the first valid North American member of the genus. *D. rathmanae* is a hyperparasitoid of pear psylla, and its biology is summarized.

Key Words: Insecta, Hymenoptera, Charipidae, *Dilyta*, Alloxystinae, Charipinae

The Charipidae has five genera and about 200 valid species that are hyperparasitoids of Homoptera, mostly aphids. *Dilyta* and *Apocharips*, containing about ten species, have been reared only from psyllids. Examination by Menke of material from the state of Washington, reared from psyllids by Robin Rathman, indicated that it belonged to *Dilyta*, but that it was not the widespread European *subclavata* Förster.

In the catalog of Hymenoptera of North America, Burks (1979) listed only one species of *Dilyta*, *necans* Kieffer (1909), described from Massachusetts, the syntypes of which had never been examined by any author. Andrews (1978) suggested that the type material of species described in Kieffer's (1909) paper might be at the Entomology

Department of the University of Arkansas, Fayetteville. The syntypes of *necans* as well as *Charips areolata* Kieffer and *Lytoxysta brevipalpis* Kieffer were found there. Examination of *necans* showed it is not a *Dilyta*, but a synonym of the holarctic *Phaenoglyphis villosa* (Hartig). Thus, Rathman's wasp is the first valid *Dilyta* in the New World and is undescribed.

The nearctic genera that are hyperparasitoids of aphids (*Alloxysta*, *Phaenoglyphis* and *Lytoxysta*) were revised by Andrews (1978). However, he did not treat several North American species, including *Alloxysta tritici* (Fitch) (1861), the oldest name in our fauna. Andrews established considerable new synonymy, but did not appreciate the holarctic nature of some species. His paper includes

a world catalog of the aphid hyperparasitoids but it is incomplete; he excluded *Dilyta*, believing it belonged to a "new subfamily."

Burks (1979) cataloged the nearctic Charipidae (as Alloxystidae), but he did not include the new taxa or synonymy of Andrews (1978), or the synonymy of Evenhuis (1973) and Evenhuis and Barbotin (1977). Subsequently Evenhuis (1982), Evenhuis and Kiriak (1985), Evenhuis and Barbotin (1987) and Fergusson (1986) established new synonymies for European species, especially in *Alloxysta*. A few charipids are now known to be holarctic, and some of the synonymy by these authors directly affects the North American fauna.

In this paper we describe the first valid North American species of *Dilyta*, and include a biological summary of it written by Robin Rathman and G. Paulson. Their summary conclusively demonstrates that the new species is a hyperparasitoid. The European *D. subclavata* is often cited as a primary parasitoid, although Herhard (1986) considers it a hyperparasitoid. Another aspect of this paper is the presentation of notes on the status and generic placement of some charipid species, and the designation of lectotypes for several. We also provide synonymic checklists for North American genera; the checklists for *Dilyta* and *Apocharips* include all currently recognized species. Complete citations for the 35 North American charipid species are not given here because they occur elsewhere (Andrews 1978, Burks 1979, Fergusson 1986, etc.). Our synonymy is largely derived from the previously cited papers, but some is new.

A key to the five valid genera of Charipidae is presented because: 1) *Hemicrisis* Förster was synonymized by Evenhuis (1973), and 2) *Apocharips* Fergusson (1986) and *Adelixysta* Kierych (1988) were recently described. We synonymize *Adelixysta* with *Alloxysta* here. *Bothriocynips* (Diaz 1979) from South America, has been attributed to the Charipidae, but from her illustrations

and the fact that the female has 11 and the male 13 flagellomeres, the genus appears misassigned; it may be a eucoilid. *Bothriocynips* was taken from an ant nest, a habitat atypical of charipids.

TAXONOMIC HISTORY AND CHARACTERS

The family name has vacillated between Alloxystidae and Charipidae. The history of this, and the confusion that has existed over type species of certain genera, has been outlined by Quinlan and Evenhuis (1980) and Fergusson (1986). The oldest family-group name, "Allotriina" Thomson (1862: 397, 406), based on the junior homonym *Allotria* Westwood, is unavailable under the provisions of Article 39 of the 1985 edition of the Code of the International Commission on Zoological Nomenclature. Incidentally, Quinlan and Evenhuis (1980) and Fergusson (1986) attribute the name Allotriinae to Förster (1869), but Thomson's usage of the name is older. The next available family-group name is Charipinae Dalla Torre and Kieffer, 1910, based on *Charips* Haliday. Although *Charips* is a junior synonym of *Dilyta* Förster, the family-group names Charipidae and Charipinae remain available under the provisions of Article 40 of the Code. The name Alloxystidae, which has been commonly used for the family until recently, is much younger, being proposed in 1931 by Hellén.

The genera were segregated into two subfamilies by Kierych (1979b): Alloxystinae and Dilytinae (= Charipinae). Biology supports this grouping; the alloxystines are hyperparasitoids of aphids and the charipines are hyperparasitoids of the Psylloidea (no other Cynipoidea are associated with Homoptera, and we regard the biology of charipids as an apomorphy for the family). Kierych (1979b) described and illustrated the two subfamilies (see also Kierych 1979a). The important differences between Alloxystinae and Charipinae noted by Kierych are summarized on Table 1.

Some of Kierych's characters are unreli-

Table 1. Kierych's (1979a, b) diagnostic characters for charipid subfamilies.

Character	Alloxystinae	Charipinae
Antennal flagellomeres	all separated by constrictions	last two flagellomeres broadly joined
Mandibular teeth	three at apex	two at apex
Frontoclypeal sulcus	present	absent
Pronotum	with or without two anterior carinae	with pair of carinae
Scutellum	rounded apically, without carinae	with carinae apically that form a projection
Marginal cell	closed or open	open
Gastral terga I-II	approximately equal	fused or I very small
Spiracles of gastral tergum VI	widely separated	narrowly separated at midline

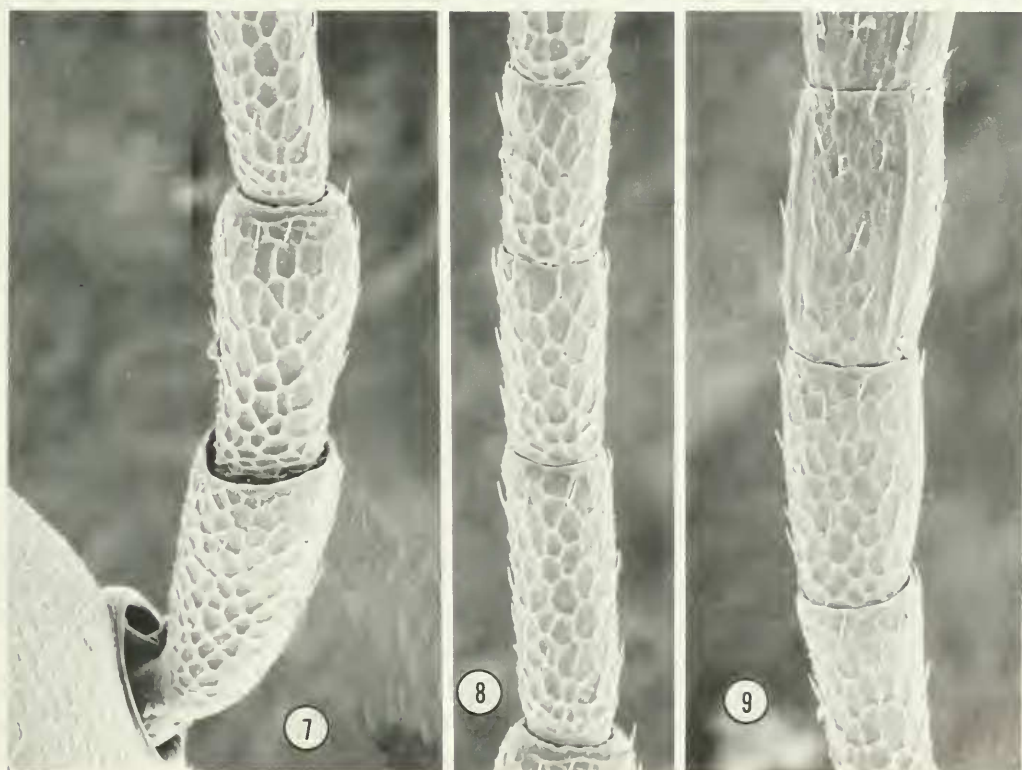
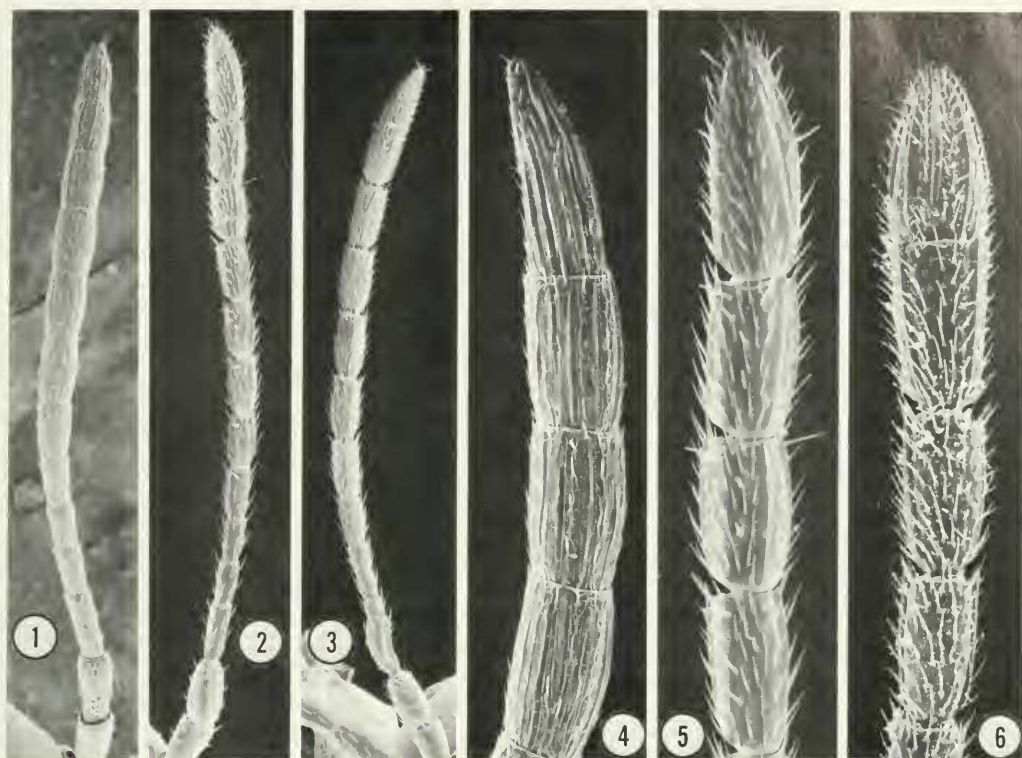
able for defining the two subfamilies. Antennal differences are questionable when the New World genus *Lytoxysta* is examined; the flagellomeres are broadly joined throughout (Figs. 1, 7-9), but this condition may be a homoplasy. Kierych (1979b) indicated that the mandible was tridentate in Alloxystinae and bidentate in Charipinae, but this differs bilaterally in the few *Alloxysta* and *Lytoxysta* that we examined. Typically the left mandible has one less tooth. The right mandible has two large teeth, and one or two much smaller ones. The left mandible has two large teeth and sometimes a third small one. In *Dilyta* both mandibles have two large teeth, but the inner one on the left mandible is very broad. Similar mandible asymmetry was noted in *Ibalia* (Ibaliidae) by Ronquist and Nordlander (1989). Thus, the number of mandibular teeth, even if restricted to one mandible, is not useful in delineating subfamilies. The frontoclypeal sulcus varies in *Alloxysta* from present to evanescent; the sulcus is absent in *Lytoxysta*. The forewing marginal cell (see especially *Alloxysta*) and pronotal charac-

ters vary in Alloxystinae and are therefore unreliable subfamily features.

The remaining characters (presence or absence of scutellar carinae apically, form of terga I and II, and location of the spiracles on tergum VI), and host differences, are the only reliable delimiters of the two subfamilies.

The scutellar difference between Charipinae and Alloxystinae has not been used since Kierych introduced it, but the protruding carinae found in *Dilyta* (inverted U-shaped, Figs. 13, 14) and *Apocharips* (M-shaped, Figs. 11, 12) support recognition of the Charipinae. Presumably the presence of these carinae is an apomorphy. Fergusson (1986) indicated that the scutellum in *Apocharips* is also margined laterally by a carina, but none is visible in SEM photographs of our material (Fig. 12). The reduction of tergum I or complete fusion with II, and the narrowly separated spiracles on tergum VI in Charipinae are also synapomorphies. Although the Charipinae is defined by synapomorphies, none are known

Figs. 1-9. Antennal details. 1, female of *Lytoxysta brevipalpis*. 2, female of *Alloxysta* sp. 3, male of *Dilyta rathmanae*. 4, last four flagellomeres of female *Lytoxysta brevipalpis*. 5, last four flagellomeres of female *Alloxysta* sp. 6, last four flagellomeres of female *Dilyta rathmanae*. 7-9, female *Lytoxysta brevipalpis*; 7, scape, pedicel and flagellomere I; 8, flagellomeres I-III; 9, flagellomeres IV-VI (note that hexagonal reticulation diminishes on VI).



for the Alloxystinae, and the latter is probably paraphyletic.

Lytoxysta is the most distinctive genus in the family, differing from all others in: lacking a triangular depression on the mesopleuron (Fig. 16); having a fine, more or less hexagonal, reticulate sculpture on the head, antenna, thorax and legs (Figs. 7-9, 15, 16, 21); having a tight cluster of special setae on the back of the head that is opposed by a similar group of setae on the anterolateral area of the pronotum (Fig. 15); having all flagellomeres connate; and lacking long fringing setae around the apical half of the forewing. All of these character states with the possible exception of the form of the antenna, are probably apomorphies. The marginal cell of *Lytoxysta* is open on three sides (only 2r and part of RS present, Fig. 24), but an incomplete cell is not unique to the genus.

Although *Lytoxysta* is substantially different from all other genera in the family, it can be assigned to the Alloxystinae on the basis of its simple scutellum, the approximately equal size of gastral terga I-II, and broadly separated spiracles on tergum VI, all presumed plesiomorphies. But this placement only emphasizes the paraphyletic nature of Alloxystinae. Moreover, the thoracic makeup of *Lytoxysta*, including general shape, is obviously quite different from the other alloxystine genera (compare Fig. 16 with 17, 18). Although the autapomorphies of *Lytoxysta* suggest that the genus could be placed in its own subfamily, recognition of three subfamilies for the five charipid genera is taxonomically irrational. More likely no subfamilies should be recognized in Charipidae.

KEY TO GENERA OF CHARIPIDAE

- 1. Mesopleuron without triangular depression dorsally (Fig. 16); forewing margin without long fringing setae apically; head and thorax with fine reticulate sculpture (Figs. 7, 15); North America *Lytoxysta* Kieffer
- Mesopleuron with triangular depression dorsally (Figs. 17-20); forewing margin with long

- fringing setae apically; head and thorax usually smooth, polished (Figs. 17-20) 2
- 2. Lower part of mesopleuron with horizontal sulcus (Fig. 17); scutum sometimes with notauli; scutellum usually with pair of large foveae basally (Fig. 22); holarctic ... *Phaenoglyphis* Förster
- Mesopleuron without horizontal sulcus (Figs. 18-20); scutum without notauli; scutellum without basal foveae (Fig. 23) 3
- 3. All flagellomeres separated by constrictions, antenna moniliform (Figs. 2, 5); visible gaster represented by at least two large terga whose dorsomedian lengths are subequal (Fig. 27); apex of scutellum rounded, without carinae (Fig. 10) *Alloxysta* Förster
- Last two flagellomeres broadly joined, preceding flagellomeres with constrictions between them (Figs. 3, 6, 34, 35, 38, 39); visible gaster represented single tergal plate (Figs. 29-32), or if two, then basal one much shorter than second along middorsal line (Fig. 28); apex of scutellum with M or inverted U-shaped carina (Figs. 12, 14) 4
- 4. Gaster with small basal tergum (Fig. 28); inner (R₁) and outer veins of forewing marginal cell essentially reaching wing margin (Fig. 25); Old World *Apocharips* Fergusson
- Gaster without small basal tergum (Figs. 29-32); inner vein (R₁) of forewing marginal cell often not reaching wing margin (Fig. 26); Holarctic and Ethiopian Regions *Dilyta* Förster

SPECIES NOTES

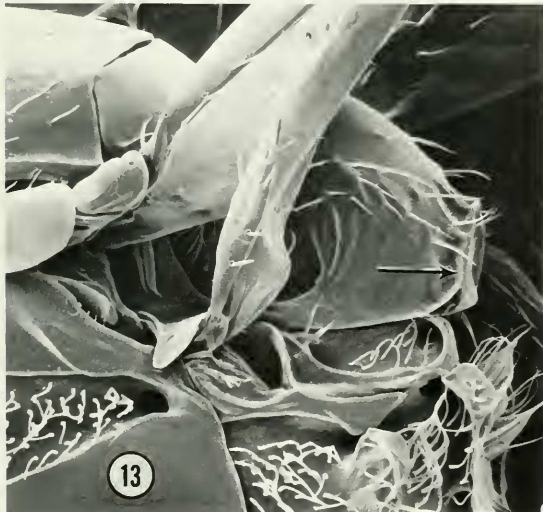
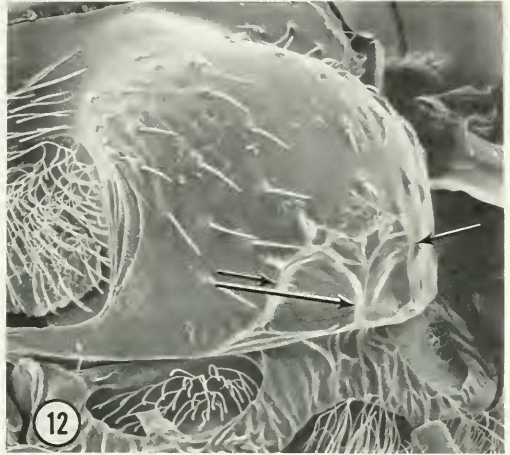
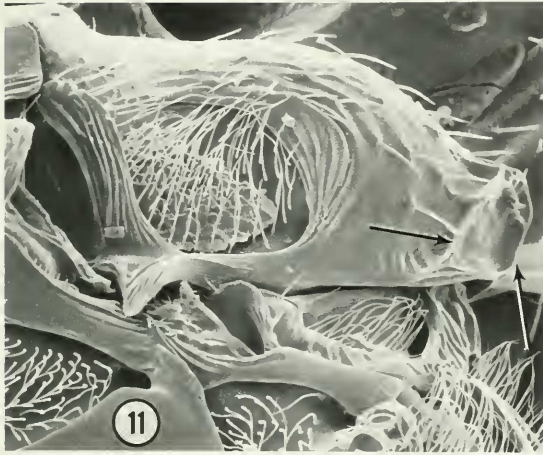
Subfamily Alloxystinae
Genus *Phaenoglyphis* Förster

Phaenoglyphis ambrosiae (Ashmead)

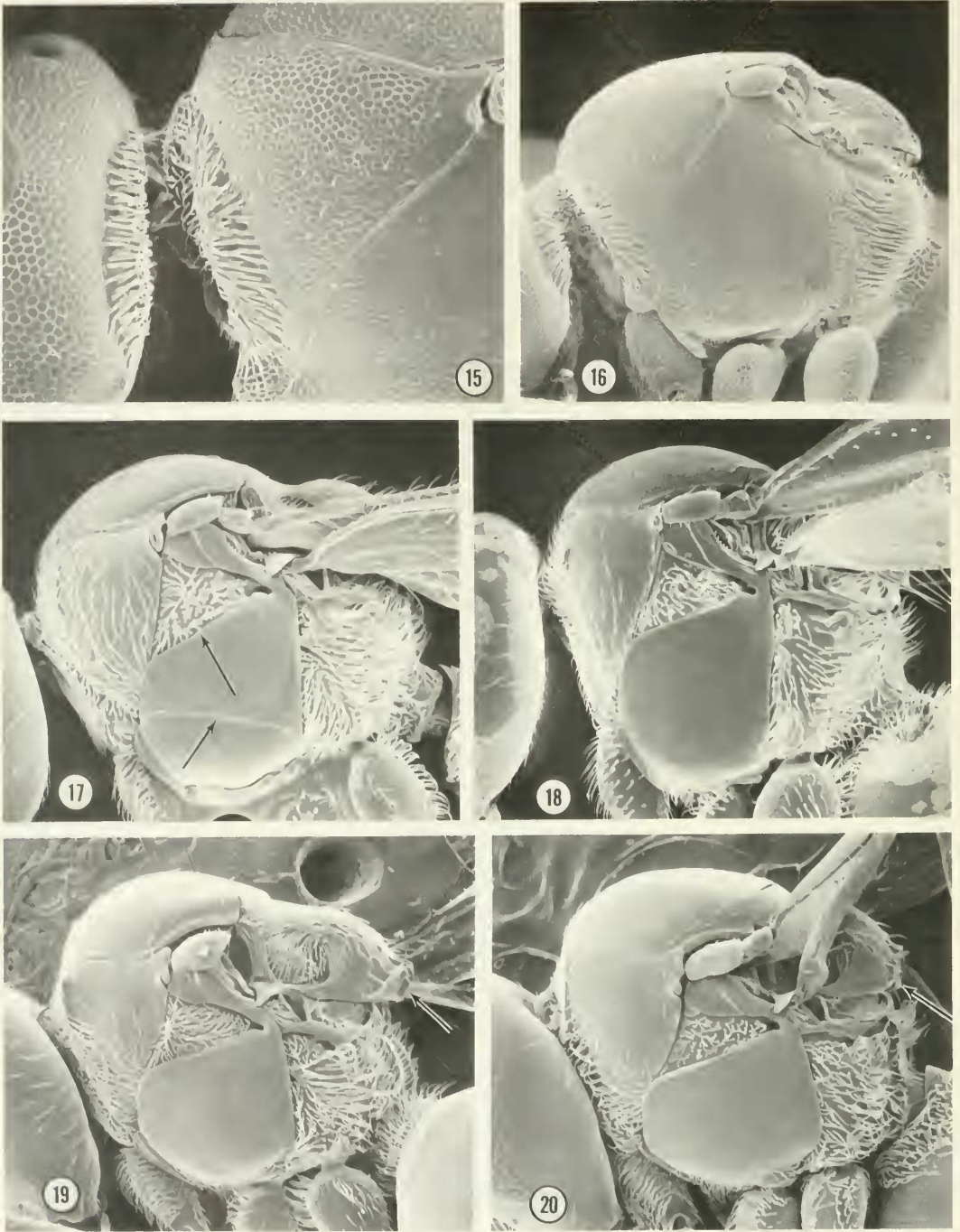
Allotria ambrosiae Ashmead, 1898: 156. Lectotype female, Cambridge, Mass., designated by Andrews (1978); in National Museum of Natural History, Washington, D.C.

Andrews (1978) placed *ambrosiae* in *Phaenoglyphis* after studying the types. He did not realize, however, that it was a junior synonym of the European species *villosa* (Hartig) (NEW SYNONYMY), now known to be holarctic.

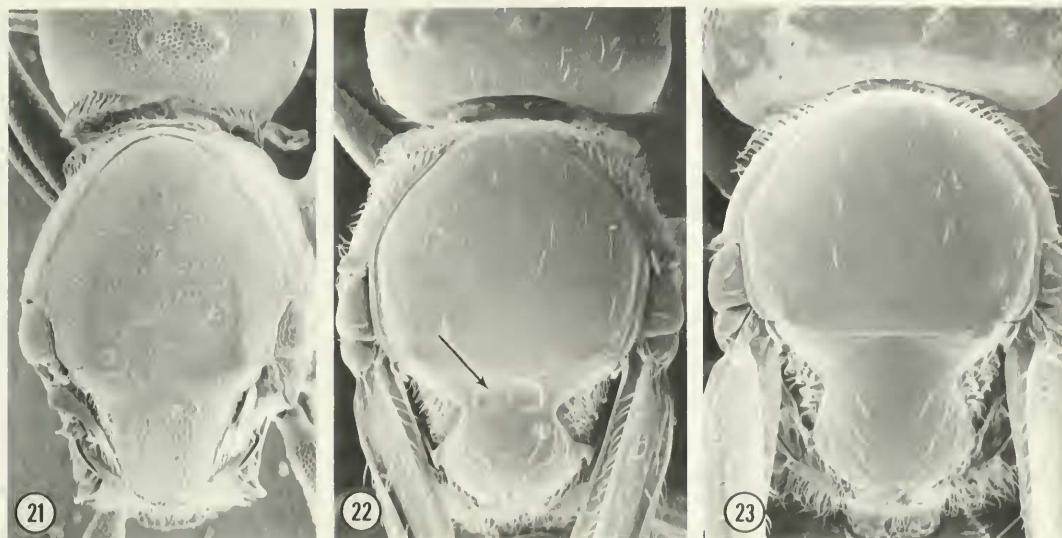
The two Ashmead syntypes are mounted on a single point, and Andrews (1978) claims to have placed a lectotype label on the pin, with the indication that the specimen closest to the tip of the point is the type. How-



Figs. 10–14. Details of scutellum, metanotum and adjacent structures. 10, *Alloxysta megourae*, left three-quarter rear view, arrow points to apical edge of scutellum. 11, 12, *Apocharips trapezoidea*; 11, left profile, arrows point to apical carinae of scutellum; 12, left three-quarter rear view, arrows point to M-shaped carina. 13, 14, *Dilyta rathmanae*; 13, left profile, arrow points to apical carina; 14, left three-quarter rear view, arrow points to inverted U-shaped carina.



Figs. 15–20. Left side of thorax and rear of head. 15. Dense setal patches on rear of head and front of pronotum, *Lytoxysta brevipalpis*. 16. *Lytoxysta brevipalpis*. 17. *Phaenoglyphis* sp. (upper arrow points to triangular depression, lower arrow to sulcus). 18. *Alloxysta* sp. 19. *Apocharips trapezoidea* (arrow points to protruding apical carinae of scutellum). 20. *Dilyta rathmanae* (arrow points to protruding apical carina of scutellum).



Figs. 21–23. Dorsum of head and thorax. 21, *Lytoxysta brevivalpis*. 22, *Phaenoglyphis* sp., arrow points to scutellar foveae. 23, *Alloxyista* sp.

ever there is no such label. We have placed a lectotype label on the pin with Andrews' name.

Andrews (1978) noted that males are very rare in North American populations of this species (as *ambrosiae*). Of 158 specimens studied only 3 were males, and only females were obtained by him in rearing experiments and from Malaise traps. Andrews suggested that the species was parthenogenetic, and his dissection of the female revealed no spermatheca, supporting his contention. In Europe *villosa* reproduces sexually, and the first male flagellomere is bent. According to Andrews (1978: fig. 46) flagellomere I in North American males is straight, suggesting that his specimens may have been misassociated. Rearing experiments are needed to ascertain the true sex ratios of *villosa* in North America.

Phaenoglyphis americana Baker

Phaenoglyphis americana Baker, 1896: 131. Lectotype male, Fort Collins, Colorado, present designation; in National Museum of Natural History, Washington, D.C.

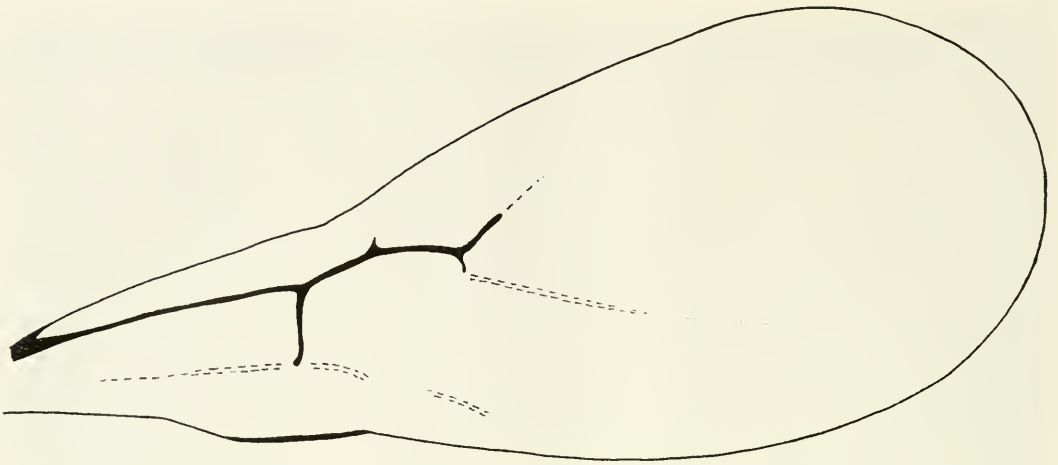
Andrews (1978: 35) misidentified the

above specimen as a female. He also treated it as the holotype in spite of indicating that a second syntype is in the Cornell University collection. We have placed a lectotype label on the USNM specimen.

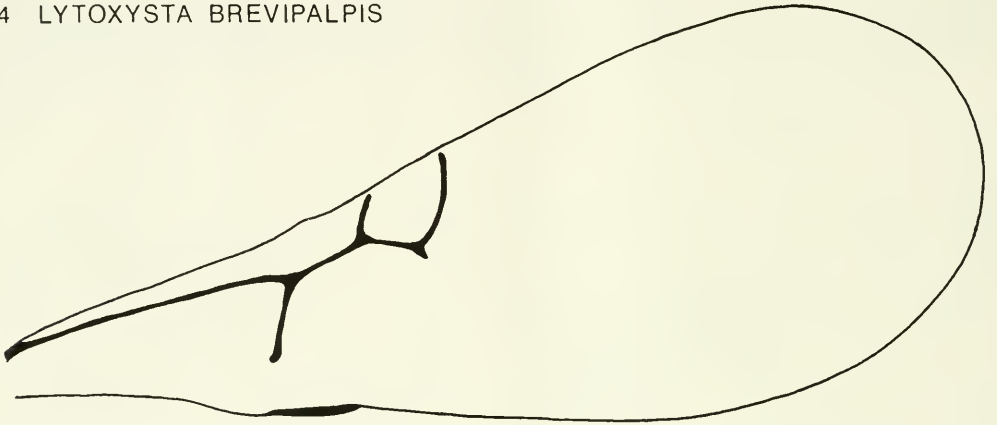
***Phaenoglyphis flavipes* (Ionescu),
NEW COMBINATION**

Charips flavipes Ionescu, 1963: 174. Holotype male, Nehoiu, Romania; in Institute of Biology, Academy of the Rumanian People's Republic, Bucharest.

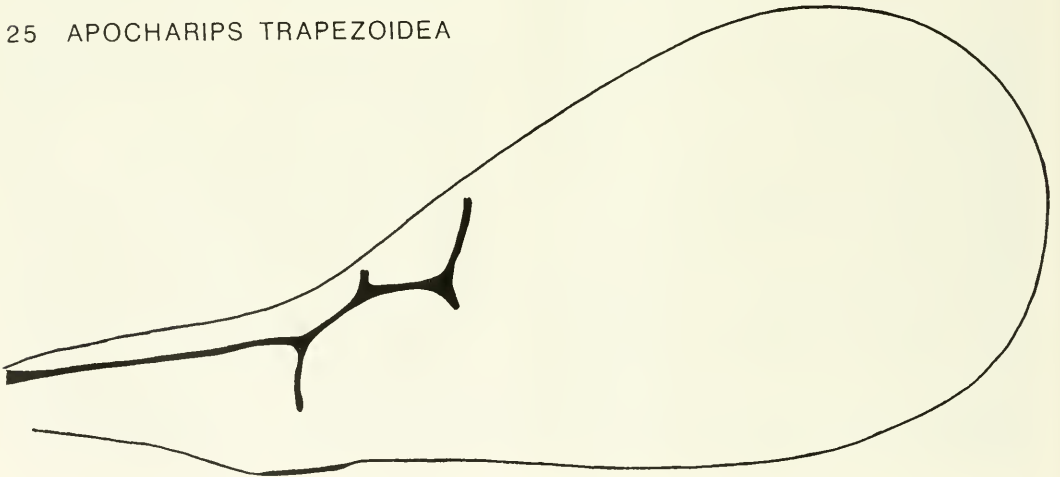
In a letter to Evenhuis in 1971, Ionescu indicated that the male type of *flavipes* has a transverse sulcus on the mesopleuron, and a pair of foveae basally on the scutellum. These features assign *flavipes* to the genus *Phaenoglyphis*. The illustrations of the antenna in Ionescu (1963, 1969) clearly indicate that *flavipes* is a synonym of *villosa* (Hartig) (NEW SYNONYMY). Although Ionescu describes the marginal cell as closed, it is open basally in *villosa* but often difficult to ascertain. The scutum lacks notauli and the second abdominal tergum is much longer than the first along the midline.



24 LYTOXYSTA BREVIPALPIS



25 APOCHARIPS TRAPEZOIDEA



26 DILYTA RATHMANAE

Figs. 24-26. Right forewing (setae not shown).

***Phaenoglyphis necans* (Kieffer),
NEW COMBINATION**

Glyptoxysta necans Kieffer, 1909: 481. "Forest Hills," Mass., col. by "Hayhurst," ex "Aphis rumicis L.?" on "*Che-nopodium album*." Lectotype female with no locality data, just the number 385 and a label with the species name, present designation; in University of Arkansas, Fayetteville.

Burks (1979) placed *necans* in *Dilyta* simply because *Glyptoxysta* was a generic synonym. The syntypes indicate however, that *necans* is a member of the genus *Phaenoglyphis* and also a junior synonym of the common European (and holarctic) *villosa* (Hartig) (NEW SYNONYMY).

The University of Arkansas possesses two female syntypes. Neither has any labels that identify them as type material of *necans*, but they are glued to the same distinctive paper points used for Kieffer's *Lytoxysta brevipennis* and *Charips areolata*. Both specimens have an identification label inscribed with the name *Glyptoxysta necans*. These labels were probably placed on the material by someone other than Kieffer. Each specimen also has a label with the number 385. Similar numbers appear on the type material of other species described in the same paper, and we are confident that these two specimens are Kieffer's syntypes of *necans*. One with most of the right antenna missing has been labeled as lectotype.

***Phaenoglyphis numidica* (Kieffer),
NEW COMBINATION**

Bothrioxysta numidica Kieffer, 1909: 482. Holotype female, "Algerien, Blidah, im Juli (Quedenfeldt)"; in Zoologisches Museum der Humboldt-Universität, Berlin.

Kieffer described *numidica* from a single female, and in 1984 Evenhuis examined the type and found it to be a synonym of *Phaenoglyphis villosa* (Hartig) (NEW SYNONYMY). The type has two labels that read "*Charips numidica* K." and "Blidah-

Médéah, Algerien, Juli–August 84, Quedenfeldt." The last label is on blue paper. Evenhuis placed two additional labels on the type: "holotype 1984, H. H. Evenhuis" (orange paper) and "*Phaenoglyphis villosa* (Hartig) female, det. H. H. Evenhuis 1984" (white paper).

Genus *Alloxysta* Förster

Alloxysta alaskensis Ashmead

Alloxysta alaskensis Ashmead, 1902: 142. Lectotype female, Muir Inlet, St. Paul Island, Alaska, designated by Andrews (1978) unknowingly; in National Museum of Natural History, Washington, D.C.

Andrews (1978: 53) regarded the above lectotype as the holotype, but it was actually one of five syntypes (3 males, 2 females). According to Article 74(b) of the Code, Andrews' recognition of a holotype constituted a lectotype designation. We have placed a lectotype label on the specimen. The right antenna past the scape is missing, as is the abdomen and the right legs beyond the coxae. The other syntypes present in the USNM, two males, are in worse condition.

Alloxysta areolata (Kieffer)

Charips areolata Kieffer, 1909: 481. "Forest Hills," Massachusetts, col. "Hayhurst." Ex an aphid "*Macrosiphum* sp.?" Lectotype female, labelled Forest Hills, Mass., present designation; in National Museum of Natural History, Washington, D.C.

This species was not treated by Andrews (1978) although the name appears in his catalog as a species of *Alloxysta*. Burks (1979) also listed the name in *Alloxysta*.

Kieffer had eight syntypes of *areolata*; one is in the University of Arkansas collection and four are in the National Museum of Natural History collection. The latter were apparently obtained by Lewis Weld in 1924 via an exchange with the University of Arkansas. All of the specimens are identical with the widespread species *Alloxysta vix-trix* (NEW SYNONYMY). We have selected

one of the USNM specimens as the lectotype. The left antenna is gone. The lectotype has a machine-printed label "Forest Hills, Mass." and the date May 29, 1909. This specimen and the others have a second label written in ink with the number 384, and a third greenish gray label. Only the lectotype has locality data. The University of Arkansas specimen has a handwritten label, apparently by Kieffer, that says "Charips arcolata K Alle mit Grünem Zettel."

Alloxysta circumscripta (Hartig)

Xystus circumscripta Hartig, 1841: 352.

Lectotype female, no locality, designated by Evenhuis, 1982; in Zoologisches Staatssammlung, Munich.

Alloxysta circumscripta (Hartig), a European wasp, was synonymized under *victrix* by Fergusson (1986) without any discussion, but the species is quite distinct (NEW STATUS). Unlike *victrix*, *circumscripta* lacks pronotal carinae and the pronotum is covered with vestiture except for a longitudinal glabrous strip at the middle. The pronotum of *victrix* is more broadly glabrous at the middle and has carinae.

Alloxysta fuscicornis (Hartig),

NEW STATUS

Xystus fuscicornis Hartig, 1841: 350, 352.

Lectotype female, Braunschweig, Germany, designated by Evenhuis, 1982; in Zoologische Staatssammlung, Munich.

Allotria ancyclocera Cameron, 1886: 85. Holotype male, Carruber Glen, Scotland; in British Museum (Natural History).

Allotria brassicae Ashmead, 1887: 14. Lectotype female, Jacksonville, Florida, designated by Evenhuis, 1974; in National Museum of Natural History, Washington, D.C.

Allotria infuscata Kieffer, 1902a: 16. Lectotype male, Amiens, France, designated by Evenhuis and Barbotin, 1987; in Musée de Picardie, Amiens.

Alloxysta fuscicornis and its synonyms

were synonymized under the common holartic species *victrix* (Westwood) by Fergusson (1986). He stated that color, especially of the head, is unreliable for separating species of *Alloxysta*, especially *victrix* and its relatives. He also said that the length of the flagellomeres varies with body size, and "must be used with care." Although *victrix* and *fuscicornis* are similar, Evenhuis has found that they are quite distinct when reared from the mummies of *Macrosiphum rosae* (Linnaeus), and related species, as well as *Brevicoryne brassicae* (Linnaeus). *Alloxysta victrix* is larger, and the head is yellowish or reddish with the vertex darker. The head is quite dark in *fuscicornis* and the antennae and legs are darker than in *victrix*. The antennal flagellomeres are comparatively longer in *victrix*. On this evidence, Evenhuis hereby resurrects *fuscicornis* from synonymy with *victrix* (NEW STATUS). It is possible that Fergusson simply confused a number of similar species, but clearly the status of *fuscicornis* and *victrix* needs further careful study.

Alloxysta hayhursti (Kieffer)

Charips hayhursti Kieffer, 1909: 481. "Forest Hills," Mass., ex "*Aphis atriplicis*," col. "Hayhurst."

Andrews (1978: 74) listed this name in the synonymy of *Alloxysta xanthopsis* (Ashmead), but did not indicate new synonymy or give evidence for treating the species as a synonym. Apparently no Kieffer specimens exist at the University of Arkansas and none are to be found in the USNM. The identity of *hayhursti* thus remains in doubt.

Alloxysta ignorata (Kieffer)

Allotria testacea Hartig of Cameron, 1889: 56. Misidentification.

Allotria testacea Hartig of Cameron, 1890: 250. Misidentification.

Allotria castanea Hartig of Cameron, 1890: 256. Lapsus for *testacea*.

Dilyta ignorata Kieffer, 1900: 114. Replace-

ment name for *Allotria testacea* of Cameron, nec Hartig, 1841.

Cameron (1889, 1890) misidentified a species that had an open marginal cell as *testacea* Hartig (Quinlan 1978a, transferred *testacea* Hartig to *Synergus* in Cynipidae). Hartig's (1841) description leaves no doubt that *testacea* has a closed marginal cell. Aware of this, Kieffer (1900) proposed a replacement name for Cameron's "testacea." Quinlan (1978b) tried to locate type material of *ignorata* under the name *testacea* in the BMNH, but was unsuccessful. Cameron (1890) used the name *testacea* in his key to species, but in the same work the name *castanea* appears where *testacea* ought to be listed in the enumeration of species. Thus the type material of *ignorata* may be labeled "castanea," not "testacea."

Kieffer (1902b) and Dalla Torre and Kieffer (1910) placed *ignorata* in the genus *Alloxysta*, and it is likely that the species is correctly assigned to that genus, rather than *Dilyta*.

Alloxysta rufipleura Baker

Alloxysta rufipleura Baker, 1896: 135. Lectotype male, Fort Collins, Colorado, present designation; in National Museum of Natural History, Washington, D.C.

Andrews (1978: 51–52) correctly synonymized *rufipleura* under *Alloxysta affinis* (Baker). He listed only one specimen which he regarded as the holotype, Baker had two males however, and we have selected and labelled one as lectotype. The lectotype has Baker's red type label also.

Alloxysta tritici (Fitch)

Allotria tritici Fitch, 1861: 841. No locality mentioned. "Swept from wheat, aphid infested," July 8, 1861. Lectotype female, labeled "15,341" and "*Allotria tritici*," present designation; in National Museum of Natural History, Washington, D.C.

This species is the earliest one described from North America. Weld (1951) listed *tri-*

tici from various states in the eastern United States and assigned the species to *Alloxysta*, but Andrews (1978) did not treat the name in his revision. Burks (1979) indicated that the proper name of the aphid from which Fitch's material was reared is *Schizaphis graminum* (Rondani), and that the host is *Aphidius nigripes* (Ashmead).

Barnes (1988) indicates that insects from the Fitch Collection are scattered but that some material was obtained by the National Museum of Natural History. In his catalog of Fitch insect material Barnes lists *tritici*, but does not mention the existence of type material, the inference being that no specimens are known to exist. There is a single specimen in the National Museum of Natural History, however, that seems to qualify as Fitch material of *tritici*. It has a genuine Fitch catalog number label, #15,341, as described and illustrated by Barnes (1988). A second label is machine printed and reads "Fitch's Coll." The specimen also has a very old handwritten ink label that reads "*Allotria tritici*" followed by what appears to be an initial that is undecipherable. This label also says "a. nigriceph." The handwriting may not be Fitch's because it is unlike that depicted in Barnes (1988: 86). The National Museum has the type of *Allotria avenae* Fitch, a wasp now assigned to the Eucolidae. *Allotria avenae* was described right after *tritici* and the type has a Fitch catalog number and "Fitch's Coll." label like those on the specimen of *tritici*. Thus it appears that the specimen of *tritici* can be considered as type material of Fitch's species.

The specimen of *tritici* is pinned sideways through the thorax with a very fine pin. That pin is stuck through a piece of cork affixed to a regular insect pin. The abdomen is missing, but the antennae are intact and indicate that the specimen is a female. All legs and wings are present. In Andrews' (1978) key to species of *Alloxysta*, this specimen runs to *victrix* (Westwood) and it compares favorably with Old and New World mate-

rial of that species. The specimen agrees with Fitch's original description. The lower part of the head is yellow, and the upper part is brownish. The scape, pedicel, first two flagellomeres and legs are yellow. The proportions of the first five flagellomeres agree fairly closely with the description, and are the same as those in *victrix*. We are treating this specimen as a Fitch syntype of *tritici*, designating it as the lectotype, and synonymizing it with *victrix* (NEW SYNONYMY).

Alloxysta vagans Kieffer

Alloxysta vagans Kieffer, 1909: 480. "Forest Hills, Massachusetts," ex "*Hyalopterus dactylidis* Hayhurst."

Andrews (1978) listed this species in his catalog but did not treat it in the main part of his revision. Apparently no type material exists at the University of Arkansas or in the USNM. Thus the identity of this species remains uncertain.

Alloxysta vandenboschi Andrews

Alloxysta vandenboschi Andrews, 1978: 69. Holotype male, 2 mi. s. Kelsey Bay, British Columbia, Canada; in National Museum of Natural History, Washington, D.C.

Examination of Andrews' type by Evenhuis has established that *vandenboschi* is a synonym of the holarctic species *obscurata* (Hartig) (NEW SYNONYMY).

Genus *Lytoxysta* Kieffer

Lytoxysta brevipalpis Kieffer

Lytoxysta brevipalpis Kieffer, 1909: 480. "Forest Hills, Massachusetts," ex *Aphis rumicis*." Lectotype female designated by Andrews, 1978: 23; in National Museum of Natural History, Washington, D.C.

Kieffer described this species from 9 specimens. One is in the University of Arkansas collection, and three are in the National Museum of Natural History. The latter were obtained by Lewis Weld in 1924 in an exchange with the Univ. of Arkansas. An-

draws (1978) selected one of the USNM specimens as lectotype and supposedly placed a "red" lectotype label on it in 1970; however, we found no such label on the specimen. It is clear which specimen Andrews designated because it is the only specimen with a locality label that reads "Forest Hills, Mass." with the date Sept. 22, 1908. A second handwritten label gives the number 388. Below it is a plain white square. We have placed a lectotype label on the pin with Andrews' name on it. The other specimens lack locality labels, but all have the 388 label and the plain white square. They do not have Andrews' paralectotype labels either, although he says they were applied. The specimen belonging to the University of Arkansas museum has an additional handwritten label, apparently Kieffer's, that reads "*Lytoxysta brevipalpis* (Alle mit rotem Zettel)." Obviously the red square labels have faded.

None of the specimens available to us show any evidence of being the material upon which Kieffer (1909: 480) described the "Var. *nigra* n. var." The status of this name remains in doubt, although Andrews (1978) synonymized it under *brevipalpis*.

Generic assignment unknown

Glyptoxysta bifoveata Girault

Glyptoxysta bifoveata Girault, 1931: 2. Syntypes: Victoria, Australia; in Queensland Museum, Brisbane.

The description of this wasp is too brief to permit positive generic assignment. The notation that it was "on peach aphis" suggests that it belongs in *Alloxysta*.

Subfamily Charipinae

Genus *Apocharips* Fergusson

Apocharips eleaphila (Silvestri),

NEW COMBINATION

Alloxysta eleaphila Silvestri, 1915: 274 (footnote). Syntypes, male and female, Italy; in Museo Zoologico della Università di Napoli?

This species was reared from the psyllid *Euphyllura olivina* (Costa) which immediately suggests that it belongs in the subfamily Charipinae. The species is briefly described in a footnote after the extensive description of another new species, *Alloxista peraptera* Silvestri, which is well illustrated. The latter is clearly an *Apocharips* because it has two abdominal terga. Silvestri did not describe the abdomen of *eleaphila*, but compared it with *peraptera*; we, therefore, assume that it also has two terga and tentatively assign it to the genus *Apocharips* (NEW COMBINATION).

***Apocharips peraptera* (Silvestri),
NEW COMBINATION**

Alloxista peraptera Silvestri, 1915: 272. Syntypes, male and female, Nefasit, Eritrea, Ethiopia; in Museo Zoologico della Unversita di Napoli?

This species was reared from the psyllid *Euphyllura aethiopica* Silvestri, and the description and figures clearly indicate that *peraptera* belongs in the genus *Apocharips* (NEW COMBINATION).

***Apocharips talitzkii* (Belizin),
NEW COMBINATION**

Glyptoxysta talitzkii Belizin, 1966: 7. Holotype male, Kishinev, Moldavian SSSR; in Zoological Museum, Academy of Sciences of the USSR, Leningrad.

The host of *talitzkii*, *Psylla pyri*, suggests that it belongs in the Charipinae. One of the distinctive features of the subfamily is the connate nature of the last two flagellomeres of the antenna, but Belizin does not mention this in his description. Nevertheless, it seems probable that *talitzkii* belongs in the genus *Apocharips* based on Belizin's description of the abdomen, and that is where we have assigned it (NEW COMBINATION).

Genus *Dilyta* Förster
***Dilyta africana* (Benoit),
NEW COMBINATION**

Alloxysta africana Benoit, 1956: 439. Holotype male ("female"), Zaire: Kivu: Ru-

tshuru; in Musée Royal de l'Afrique Centrale, Tervuren, Belgium.

Benoit had 25 specimens when he described *africana*. Evenhuis examined nine, including the holotype, and the species belongs in the genus *Dilyta* (NEW COMBINATION). The holotype is a male but Benoit mistakenly identified it as a female. He gave the relative lengths and widths of the flagellomeres which agree with the holotype, except that one of the flagellomeres between the sixth and the twelfth (all with the same relative lengths of 7.5 and widths of 3) was obviously omitted. Benoit described flagellomere I as being slightly curved, indicating that his holotype was a male, not a female.

Although Benoit said the gaster had two visible segments and even gives their relative lengths, the type, as well as the paratypes, have only one tergum. The species thus clearly belongs in *Dilyta*. The species exhibits other characteristics typical of the genus *Dilyta*: scutellum with U-shaped apical carina; marginal cell shape typical for the genus, except both R_1 and RS reach the wing margin.

Generic assignment unknown

Dilyta mascagnini Girault

Dilyta mascagnini Girault, 1935: 2. Syntypes, Sandgate, Australia; in Queensland Museum, Brisbane.

The description of this wasp is too brief and vague to determine if it belongs in *Dilyta*. Girault stated that the "club" of the antenna was "2-jointed"; this suggests it belongs in the subfamily Charipinae. But his mention of "abdomen glabrous, 2 exceeding 3 and over half the abdomen" makes that assignment doubtful. Girault compared *mascagnini* with *Alloxysta thoreauini*, another Australian species which he described as new in the same paper. The abdomen of *thoreauini* was described as "non-segmented," suggesting that this species really belongs in *Dilyta*. Only a study of Girault's

type material will clarify the status of *mas-cagnini*.

Checklists of Charipidae

North American species of subfamily

Alloxystinae Hellén, 1931

(= *Allotriinae* Thomson, 1862)

Phaenoglyphis Förster 1869

Generic synonyms

Hemicrisis Förster, 1869. Syn.: Evenhuis (1973), Fergusson (1986).

Auloxysta Thomson, 1877.

Bothrioxysta Kieffer, 1902.

Charipsella Brèthes, 1913.

americana Baker, 1896; Canada: Northwest Territories, British Columbia, Alberta, Manitoba, Ontario, Quebec, New Brunswick; U.S.: Alaska, California, Colorado, Utah, Maryland.

brevicornis Kieffer, 1907. Syn.: Andrews (1978).

nevadensis Kieffer, 1907. Syn.: Andrews (1978).

calverti Andrews, 1978; U.S.: California.

falcata Andrews, 1978; Canada: British Columbia.

gutierrezii Andrews, 1978; Canada: British Columbia, Saskatchewan; U.S.: Montana.

laevis Andrews, 1978; Canada: British Columbia, Alberta.

pecki Andrews, 1978; U.S.: Tennessee.

pilosa Andrews, 1978; Canada: British Columbia, Alberta; U.S.: Idaho, Colorado, California.

ruficornis (Förster), 1869 (*Hemicrisis*); Holarctic: Europe, North America. Canada: British Columbia, Saskatchewan, Ontario, Quebec; U.S.: California, North Carolina.

pubicollis (Thomson), 1877 (*Allotria*). Syn.: Evenhuis (1973).

stenos Andrews, 1978; U.S.: Alaska

villosa (Hartig), 1841 (*Xystus*); Holarctic: Europe, North America. Canada: Northwest Territories, British Columbia, Al-

berta, Ontario, New Brunswick, Nova Scotia; U.S.: California, Massachusetts.

picipes (Thomson), 1862 (*Allotria*). Syn.: Evenhuis and Barbotin (1977).

collina (Cameron), 1889 (*Allotria*). Syn.: Evenhuis and Barbotin (1977).

ambrosiae (Ashmead), 1898 (*Allotria*).

NEW SYNONYMY

carpentieri (Kieffer), 1902 (*Allotria*). Syn.: Evenhuis and Barbotin (1977).

foveigera (Kieffer), 1902 (*Allotria*). Syn.: Evenhuis and Barbotin (1977).

curvata (Kieffer), 1902 (*Allotria*). Syn.: Evenhuis and Barbotin (1977).

recticornis (Kieffer), 1902 (*Allotria*). Syn.: Evenhuis and Barbotin (1977).

subaptera (Kieffer), 1904 (*Alloxysta*). Syn.: Evenhuis and Barbotin (1977).

campyla (Kieffer), 1904 (*Alloxysta*). Syn.: Evenhuis and Barbotin (1977).

necans (Kieffer), 1909 (*Glyptoxysta*). NEW SYNONYMY

numidica (Kieffer), 1909 (*Bothrioxysta*). NEW SYNONYMY

flavipes (Ionescu), 1963 (*Charips*). NEW SYNONYMY

Alloxysta Förster, 1869

Generic synonyms

Allotria Westwood, 1833, nec Hübner, 1823

Xystus Hartig, 1840, nec Schoenherr, 1826

Pezophycta Förster, 1869

Nephycta Förster, 1869

Thoreauana Girault, 1930

Adelixysta Kierych, 1988, NEW SYNONYMY

Alloxista is incorrect subsequent spelling

Our efforts to obtain type material of *Adelixysta* have been unsuccessful, but we are convinced that Kierych's (1988) new genus is a synonym of *Alloxysta* (NEW SYNONYMY). Clypeal characters are the only features that seem to differentiate *Adelixysta sawoniewiczzi*, type species of the new genus, from most species of *Alloxysta*. The sulcus between the tentorial pits (frontoclypeal sulcus) is faintly impressed, and the free margin of the clypeus is truncate instead of

arcuate. *Alloxysta pallidicornis* (Curtis) has a truncate clypeus also, but the species has a strongly impressed frontoclypeal sulcus. Both taxa have the same propodeal carinae but they differ in antennal and wing characters.

Alloxysta pallidicornis attacks species of *Pauesia* that parasitize lachnine aphids on conifers, and *sawoniewiczzi* will likely be found in similar hosts. A third and as yet undescribed species is known in this complex that was reared from *Pausia cendrobii* on *Cedrus* in Morocco.

affinis (Baker), 1896 (*Dylita*); Colorado.

abdominalis Baker, 1896. Syn.: Andrews (1978).

apicalis Baker, 1896. Syn.: Andrews (1978).

coloradensis (Baker), 1896 (*Dylita*). Syn.: Andrews (1978).

gracilis Baker, 1896. Syn.: Andrews (1978).

magna Baker, 1896. Syn.: Andrews (1978).

ruficeps (Baker), 1896 (*Dylita*), nec Zetterstedt, 1838. Syn.: Andrews (1978).

rufipleura Baker, 1896. Syn.: Andrews (1978).

similis (Baker), 1896 (*Dylita*). Syn.: Andrews (1978).

alaskensis Ashmead, 1902; Canada: Quebec; U.S.: Alaska.

bakeri (Kieffer), 1907 (*Allotria*); U.S.: California. Possibly a synonym of *megourae*, see Andrews (1978: 47).

bicolor (Baker), 1896 (*Dylita*); Canada: British Columbia; U.S.: Colorado.

robusta Baker, 1896. Syn.: Andrews (1978).

commensurata Andrews, 1978; U.S.: Maryland.

coniferensis Andrews, 1978; U.S.: Tennessee.

dicksoni Andrews, 1978; U.S.: Maryland.

filimentosa Andrews, 1978; U.S.: Idaho.

fuscicornis (Hartig), 1841 (*Xystus*); Holarctic Region (NEW STATUS)

ancylocera (Cameron), 1886 (*Allotria*). Syn.: Evenhuis (1982).

brassicae (Ashmead), 1887 (*Allotria*). Syn.: Evenhuis (1982).

infuscata (Kieffer), 1902 (*Allotria*). Syn.: Evenhuis (1982).

grioti (De Santis), 1937 (*Charips*). Syn.: Diaz (1980).

aphidiinaecida (De Santis), 1937 (*Charips*). Syn.: Diaz (1980).

halli Andrews, 1978; Canada: British Columbia, Alberta; U.S.: Washington.

lachni (Ashmead), 1885 (*Allotria*); Canada: British Columbia, Manitoba, Ontario;

U.S.: California, North Carolina, Florida.

lackni "Dalla Torre and Kieffer," Andrews (1978: 63), apparently a lapsus.

leguminosa (Weld), 1920 (*Charips*); U.S.: Idaho, Oregon, Utah. Possibly a synonym of *megourae* according to Andrews (1978: 65).

longiventris Baker, 1896; U.S.: Colorado. Not treated by Andrews (1978).

megourae (Ashmead), 1887 (*Allotria*); U.S.: Florida.

minuscula Andrews, 1978; Canada: Ontario.

minuscula Andrews, 1978: 48, lapsus.

obscurata (Hartig), 1840 (*Xystus*); Holarctic: Europe, North America. Canada:

British Columbia; U.S.: Alaska.

homotoma Kieffer, 1904. Syn.: Evenhuis and Barbotin (1987).

vandenboschi Andrews, 1978. NEW SYNONYMY.

pallidicornis (Curtis), 1838 (April 1) (*Cynips*); Holarctic: Europe, North America.

Canada: Alberta, Quebec; U.S.: Alaska, Colorado. Tax.: Quinlan and Fergusson

(1981).

minuta (Zetterstedt), 1838 (Dec. 31) (*Cynips*). Syn.: Evenhuis and Kiriak

(1985).

forticornis (Giraud), 1860 (*Allotria*). Syn.: Quinlan and Fergusson (1981).

basalis (Thomson), 1862 (*Allotria*). Syn.: Evenhuis and Kiriak (1985).

- anthracina* Andrews, 1978. Syn.: *Evenhuis* and Kiriak (1985).
- quebeci* Andrews, 1978; Canada: Quebec.
- rauchi* Andrews, 1978; Canada: British Columbia.
- schlinger* Andrews, 1978; U.S.: Arizona.
- vagans* Kieffer, 1909; U.S.: Massachusetts. Not treated by Andrews (1978).
- victrix* (Westwood), 1833 (*Allotria*); Nearctic, Palearctic and Neotropical Regions.
- ruficeps* (Zetterstedt), 1838 (*Cynips*).
- erythrocephalus* (Hartig), 1840 (*Xystus*). Syn.: *Evenhuis* (1972, 1982).
- tritici* (Fitch), 1861 (*Allotria*). **NEW SYNONYMY.**
- macrocera* (Thomson), 1877 (*Allotria*). Syn.: *Evenhuis* (1982).
- atriceps* (Buckton), 1879 (*Cynips*). Syn.: Fergusson (1986) but types apparently not examined.
- curvicornis* (Cameron), 1883 (*Allotria*). Syn.: Fergusson (1986).
- amygdali* Buckton, Kieffer, 1902a (*Cynips*), lapsus for *atriceps* (Buckton). Syn.: Fergusson (1986).
- lateralis* (Kieffer), 1902b (*Allotria*). Syn.: *Evenhuis* and Barbotin (1987).
- luteiceps* (Kieffer), 1902b (*Allotria*). Syn.: *Evenhuis* and Barbotin (1987).
- luteicornis* (Kieffer), 1902b (*Allotria*). Syn.: *Evenhuis* and Barbotin (1987).
- grandicornis* (Kieffer), 1904 (*Allotria*). Syn.: *Evenhuis* and Barbotin (1987).
- aerolata* (Kieffer), 1909 (*Charips*). **NEW SYNONYMY.**
- xanthopsis* (Ashmead), 1896 (*Allotria*); Canada: British Columbia; U.S.: Alaska, California, Utah, Massachusetts, Florida.
- ? *hayhursti* (Kieffer), 1909 (*Charips*). Syn.: Andrews (1978) implied this synonymy but it remains unproven.

Lytoxysta Kieffer, 1909

- brevipalpis* Kieffer, 1909; Canada: British Columbia, Alberta, Manitoba, Saskatchewan; U.S.: California, Colorado, Idaho, Massachusetts, Ohio, Utah, Washington.
- nigra* Kieffer, 1909. Syn.: Andrews (1978).

World species of subfamily
Charipinae Dalla Torre and Kieffer, 1910
(= Dilytinae Kierych, 1979)

The best general morphological description of this subfamily is by Kierych (1979a, b), although his nomenclature is incorrect in part. Morphology and taxonomy of the group are also treated by Fergusson (1986). So far as known, all charipines are hyperparasitoids in Psylloidea.

Apocharips Fergusson, 1986

- eleaphila* (Silvestri), 1915 (*Alloxista*). Italy. Reared from *Euphyllura olivina* (Costa). **NEW COMBINATION.**
- peraptera* (Silvestri), 1915 (*Alloxista*). Eritrea, Ethiopia. Reared from *Euphyllura aethiopica* Silvestri. **NEW COMBINATION.**
- talitzkii* (Belizin), 1966 (*Glyptoxysta*). Moldavian SSR. Reared from *Psylla pyri* (L.). **NEW COMBINATION.**
- trapezoidea* (Hartig), 1841 (*Xystus*). Europe. Reared from *Psylla* sp. **NEW COMBINATION.**
- xanthocephala* (Thomson), 1862 (*Allotria*). Syn.: *Evenhuis* (1982).

Dilyta Förster, 1869

Generic synonyms

- Dilyta* Förster, 1869, an incorrect subsequent spelling.
- Charips* Haliday in Marshall, 1870.
- Glyptoxysta* Thomson, 1877.
- africana* (Benoit), 1956 (*Alloxysta*); Zaire. **NEW COMBINATION.**
- rathmanae* Menke and Evenhuis, new species. Washington State. Reared from *Cacopsylla alba* (Crawford) and *C. pyricola* (Förster).
- subclavata* Förster, 1869. Europe. Reared from *Psylla pyri* (L.) and *Psyllopsis fraxini* (L.).
- microcera* (Haliday) in Marshall, 1870 (*Charips*). Syn.: Quinlan and Evenhuis (1980).
- heterocera* (Thomson), 1877 (*Glyptoxysta*). Syn.: Hellén (1963).

thoreauini (Girault), 1935 (*Alloxysta*); Australia. **NEW COMBINATION.**

***Dilyta rathmanae* Menke and Evenhuis,
NEW SPECIES**

(Figs. 3, 6, 13, 14, 20, 26, 31–34,
36, 38, 40)

Black except antenna and legs yellow, apical half of flagellum and mid and hindlegs sometimes suffused with brown. Thorax with patches of dense, wool-like, white setae as follows (the white color may be due to some exudate because it is missing on a few specimens): on pronotum dorsolaterally and laterally, on scutellum laterally, on subalar fossa of mesopleuron, on metapleuron just beneath hindwing base, on propodeum posterolaterally just above hindcoxa, and also posteromedially. Setal girdle at base of tergum I similar. Female antenna as in Figs. 6, 34, 36; comparative lengths of pedicel and flagellomeres I–XI: 9.5:5.0:2.75:3.2:3.5:4.5:5.4:7.75:8.5:9.0:9.25:9.0; flagellomere I length less than twice width (10.5:5.5); flagellomeres I–VI without linear tyli, following articles with them. Male antenna as in Figs. 3, 33, 38, 40; comparative lengths of pedicel and flagellomeres I–XII: 6.5:7.25:2.25:3.0:5.0:7.75:7.75:7.75:8.25:8.5:8.5:9.0:9.0; flagellomeres I–III or IV without linear tyli, following articles with them. First tergum usually without obvious pitting on apical half (Figs. 31, 32). Body length 0.9–1.2 mm.

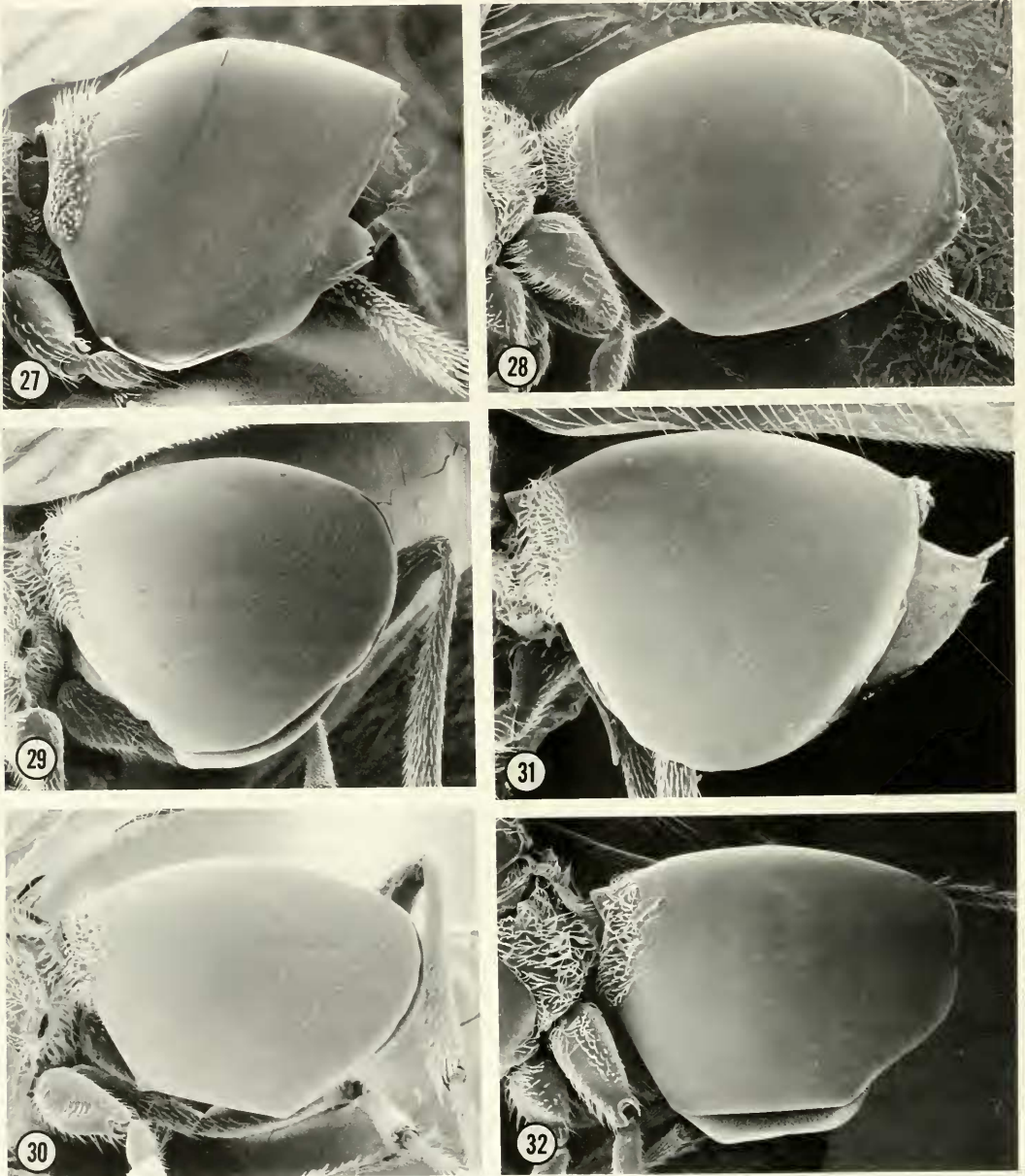
Types: Holotype male: WASHINGTON, Chelan Co.: Nahahum Canyon near Wenatchee River (13 km n. Wenatchee), 180 m, ex *Cacopsylla alba* on *Salix exigua*, May 31, 1986, Robin Rathman, voucher #86-2-11 (in collection of National Museum of Natural History, Washington, D.C.). Paratypes, 23 females, 11 males, some with same data as holotype except different dates in 1985–1986, others from following localities in Chelan County, Washington: McManus Orchard, Yaxon Canyon, 6.6 km s. Cashmere, elev. 242 m, June 18, 1987, June 23, 1988, G. S. Paulson; Pflugrath Orchard,

Derby Canyon, 8.3 km se. Leavenworth, July 8 and 15, 1986, G. S. Paulson; Dryden, July 8, 1987, G. S. Paulson. Paratypes in the Entomology Collection, Washington State University, Pullman; the National Museum of Natural History; the H. H. Evenhuis Collection; the British Museum (Natural History); and the American Entomological Institute, Gainesville, Florida.

Discussion: *Dilyta rathmanae* differs from the Old World species *subclavata* Förster in several ways. The easiest feature to appreciate is the apparent absence in most specimens of *rathmanae* of the rather dense field of pits found on tergum I of *subclavata* (compare Figs. 29, 30 and 31, 32). Actually a few scattered pits are present in most specimens of *rathmanae* but they are very shallow and barely visible even in SEM photomicrographs. One exception is a single male of *rathmanae* that has a clearly seen field of rather deep pits.

Differences between the two species are also found in the distribution of antennal tyli (compare Figs. 33, 36, 40 and 37, 41), especially in the female. Specifically, tyli are absent on the first six flagellomeres of the female of *rathmanae* (Fig. 36) but only absent on the first four of *subclavata* (Fig. 37). Tyli are absent on flagellomeres I–III or IV of the male in *rathmanae* (Fig. 33), and are absent on I–II or III of *subclavata* (Fig. 41). The overlap between the two species in the distribution of male antennal tyli makes them more difficult to distinguish in this sex. In both species the basalmost male flagellomere with tyli seems to have only one or two of these structures, and determining their presence can be very difficult, even at 250× magnification. Subsequent flagellomeres typically have several tyli that are rather conspicuous. Four of the seven males of *rathmanae* have tyli on flagellomere III which suggests that these structures are absent on that flagellomere about 50% of the time.

The proportions of the pedicel and flagellomeres I–II also differ between the two



Figs. 27-32. Left view of gaster. 27, female *Alloxyta megourae*. 28, female *Apocharips trapezoidea*. 29-30, female and male, respectively, *Dilyta subclavata*. 31-32, female and male, respectively, *Dilyta rathmanae*.

Figs. 33-41. Antennal features in *Dilyta*. 33, right male flagellomeres I-VII of *rathmanae* (arrows point to tyli on V-VI). 34, 35, female, *rathmanae* and *subclavata*, respectively. 36, 37, apex of pedicel, and first six flagellomeres of female *rathmanae* and *subclavata*, respectively. 38, 39, male, *rathmanae* and *subclavata*, respectively. 40, 41, apex of pedicel, and first four or five flagellomeres of male *rathmanae* and *subclavata*, respectively.



species. In the female of *rathmanae* flagellomere I is less than twice as long as wide, and its length is about half that of the pedicel (Figs. 34, 36). In the female of *subclavata* flagellomere I is more than twice as long as wide (13:5), and its length is more than three-fourths as long as the pedicel (13:16) (Figs. 35, 37). In males of *rathmanae* flagellomere II is about one-third the length of I (Figs. 33, 40). Whereas, in males of *subclavata* it is about half the length of I (Figs. 39, 41).

Dilyta rathmanae is a smaller insect (.9–1.2 mm) than *subclavata* (1.2–1.5 mm).

Distribution: Known with certainty only from Chelan Co., Washington. However Ferris and Hyatt (1923) reared a species of "Alloxysta" from the psyllid *Neophyllura arbuti* (Schwarz) in California (we are following Hodkinson, 1988, for current nearctic psyllid names in this paper). It seems likely that what they really had was a species of *Dilyta*.

Etymology: We take pleasure in naming this little wasp after its discoverer, Robin Rathman.

BIOLOGICAL SUMMARY OF *DILYTA RATHMANAE*

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Dilyta rathmanae was first reared from *Cacopsylla alba* (Crawford) on willow, *Salix exigua* L., in 1985 in Washington State (Rathman and Brunner 1988). Adults were also collected in unsprayed pear orchards and may be an important component of the pear psylla complex, *Cacopsylla pyricola* (Förster). Recent European authors disagree whether species of the Charipinae are primary or hyperparasitoids. Fergusson (1986, 1988) reported that *Dilyta subclavata* Förster, the single European species of the genus, is a primary parasitoid of psyllids. In

southern France, however, this species was reported by Herhard (1986) to be a hyperparasitoid of *Psylla pyri* (L.), through an encyrtid, *Prionomitus mitratus* (Dalman). Our field observations and rearing experiments have shown that *Dilyta rathmanae* is a hyperparasitoid of psylla through an encyrtid, *Trechnites* sp.

In laboratory rearing experiments conducted in July and August, 1987, parasitoid-free psylla nymphs were placed in cages (about 4 mm × 20 mm diam.) designed to confine the psylla to the leaf surface of pear seedlings. Adult *Trechnites* collected from pear trees and adults of *Dilyta* collected from *Salix* were added to one group of cages. Adults of *Dilyta* were only added to the second group. At the completion of the study adults of *Dilyta* and *Trechnites* had emerged from pear psylla mummies in group one, but in the second group that had been exposed only to *Dilyta*, the pear psylla were not parasitized. This indicates that *Dilyta rathmanae* is not a primary parasitoid of pear psylla. Observations of field collected mummies of *C. pyricola* and *C. alba* confirmed the laboratory results.

On 7 and 8 August 1988 parasitized psylla were collected from *Salix* and examined in the laboratory. One parasitized psylla contained a partially consumed adult of *Trechnites* and a cynipoid larva. Similarly in July 1988 a partially consumed pupa of *Trechnites* and a cynipoid larva were found within a parasitized *C. pyricola*. In this instance the cynipoid larva pupated and an adult female of *Dilyta* emerged. In August 1988 a mummy of *C. pyricola* was collected in which the forms of two distinct parasitoid pupae could be seen through the cuticle of the psylla. Two days later an adult male of *Dilyta* emerged. The psylla mummy was then dissected and a partially consumed *Trechnites* was recovered. These studies support the findings of Herhard (1986) and indicate that *Dilyta rathmanae* is a hyperparasitoid of *C. alba* and *C. pyricola*.

Thus members of both the Charipinae and Alloxystinae are hyperparasitoids. The Al-

loxystinae are hyperparasitoids of aphids via Aphidiinae (Braconidae) and Aphelinidae (Chalcidoidea) (Fergusson 1988), while the Charipinae are hyperparasitoids via Encyrtidae (Chalcidoidea). Both hyperparasitism and the use of Homoptera as hosts are probable behavioral synapomorphies of the Alloxystinae and Charipinae that indicate the Charipidae is a monophyletic group.

ACKNOWLEDGMENTS

Chris Carlson (Dept. of Entomology, Univ. of Arkansas, Fayetteville) lent the Kieffer material for our study. Eliane de Coninck (Musée Royal de l'Afrique Centrale, Tervuren, Belgium) lent type material of *Alloxysta africana* Benoit to Evenhuis for study. Robin Rathman (formerly of the Tree Fruit Research Center, Wenatchee, Washington) and G. S. Paulson (Dept. of Entomology, Washington State University, Pullman) furnished the material of the new *Dilyta*.

Göran Nordlander (Swedish University of Agricultural Sciences, Uppsala) and Nigel Fergusson (British Museum (Natural History)) reviewed several drafts of our manuscript. Allan Norrbom, Sueo Nakahara, and Eric Grissell (Systematic Entomology Laboratory, USDA, Washington, D.C.), John Sorensen, California Dept. of Food and Agriculture, Sacramento, California, Byron Alexander, University of Kansas, Lawrence, Kansas, and David Wahl, American Entomological Institute, Gainesville, Florida reviewed the final ms.

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